Results from the Data Collection in Antarctica

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The Participants

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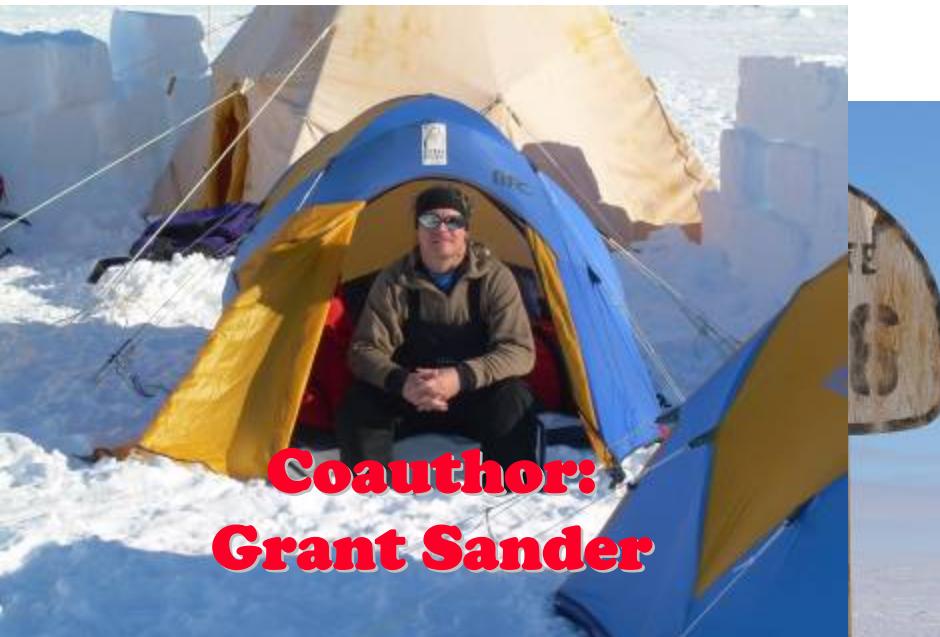
Introduction

- **The main purpose of the data collection in Antarctica was to "demonstrate the capability of the Sandia National Laboratories (SNL) Miniature Synthetic Aperture Radar (MiniSAR) to detect crevasses in potential landing areas for the New York Air National Guard (NYANG)"**

Background

- **LC130 aircraft - "These heavy-lift, long-range aircraft, with their deep-field landing capability (i.e., landing in areas without prepared skiways) have been instrumental in allowing research to be carried out virtually anywhere on the continent."**
- **The landing zones are susceptible to crevasses hidden by snow bridges**
- **Rescue of these LC-130 aircraft in deep-field locations is expensive and potentially dangerous**

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Background

Sites Imaged

- **McMurdo/Scott Base**
  - **Radar Checkout**
  - **RFI**
  - **Viewgraph engineering**
- **Pegasus**
  - **Look for objects on/in the ice**
- **Traverse site**
  - **Known crevasse area mapped a couple years ago with GPR**
- **Tres Hermanas (3 sisters) site**
  - **ANG and mountaineers found 3 relatively small crevasses hard to detect visually from the air**
- **Simulated Crevasse**
 - **Investigate snow/ice penetration**

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Sites Imaged

- – **Taylor Dome (3 different areas)**
  - **Crevassed area**
  - **Drill site (area where buried objects may have been left)**
  - **Runway site (area with objects on and in?? Snow)**
- **Type of data collected**
  - – **Circles**
  - – **Spotlight**
  - – **Spotmap**

Antarctica Map

McMurdo/Scott Base

S 77°50.512'
E 166°39.334'

S 77°50.499'
E 166°41.560'

S 77°50.935'
E 166°39.391'

S 77°50.922'
E 166°41.619'

S 77°50.862'
E 166°45.603'

S 77°50.856'
E 166°46.479'

S 77°51.018'
E 166°45.625'

S 77°51.013'
E 166°46.501'

0   0.25   0.5 mi

Background: Digital Globe image Feb 19, 2006

0607_R988Hallman_McMScottBaseCorners
01 December 2006 JWalker RPSC

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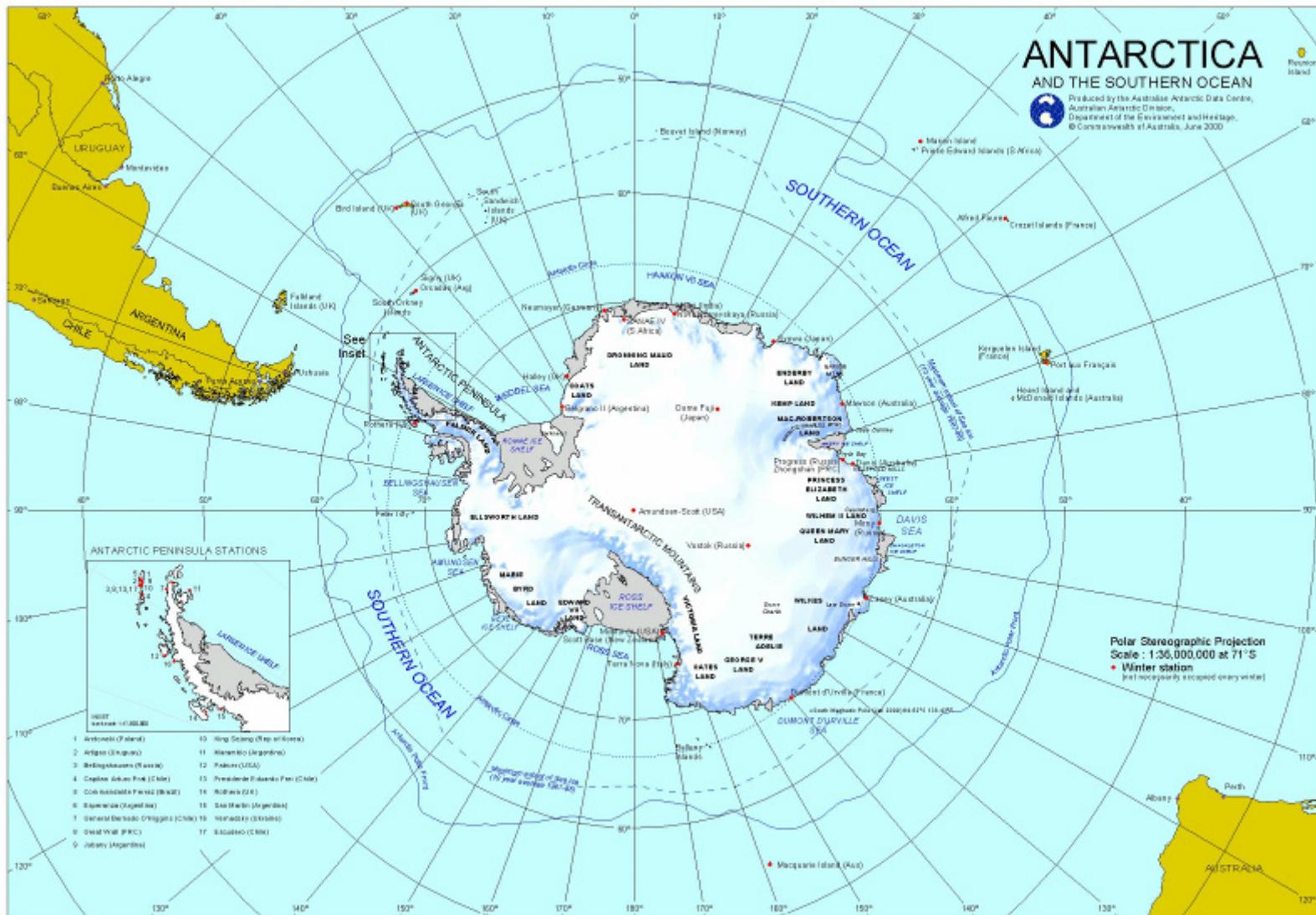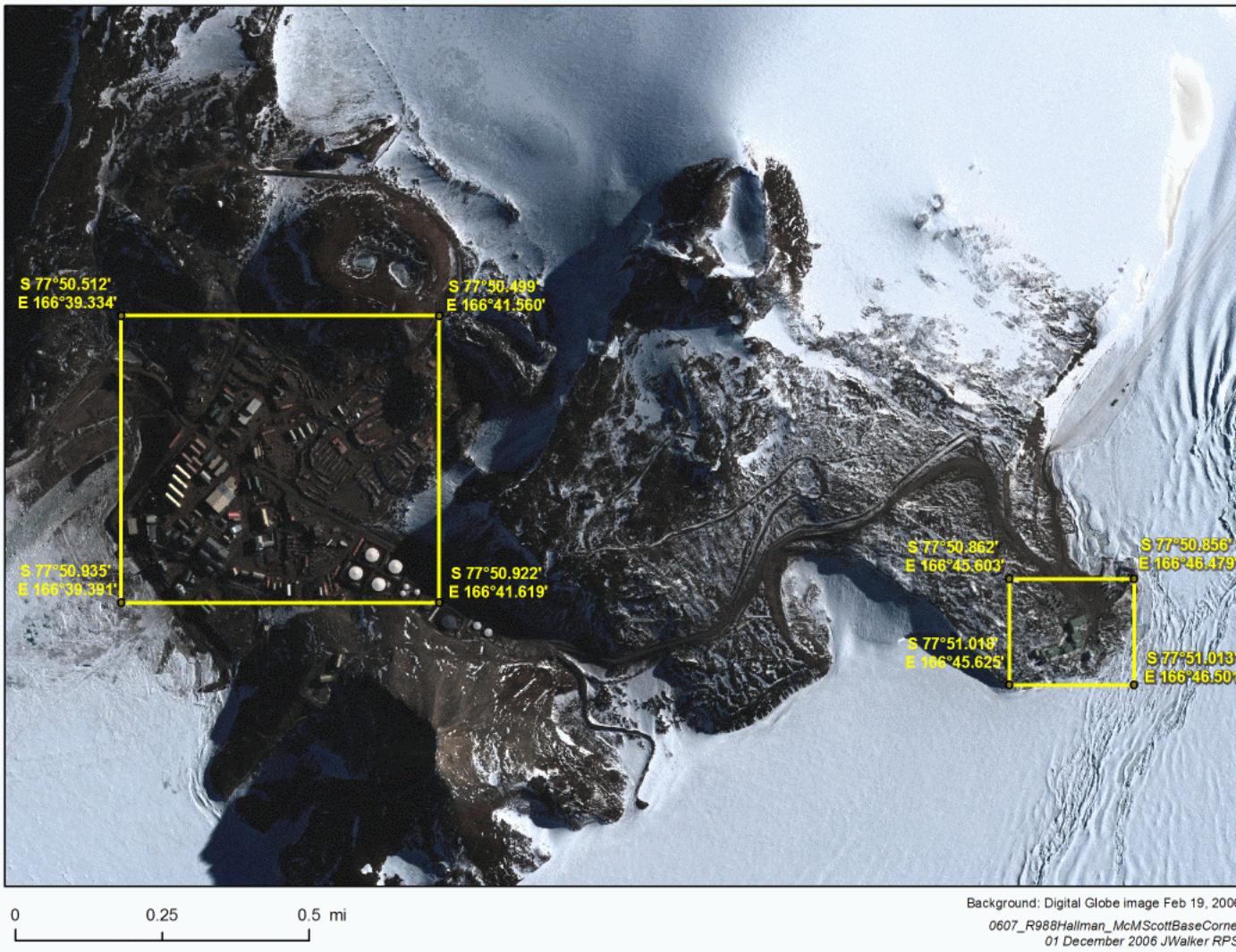
McMurdo/Scott Base
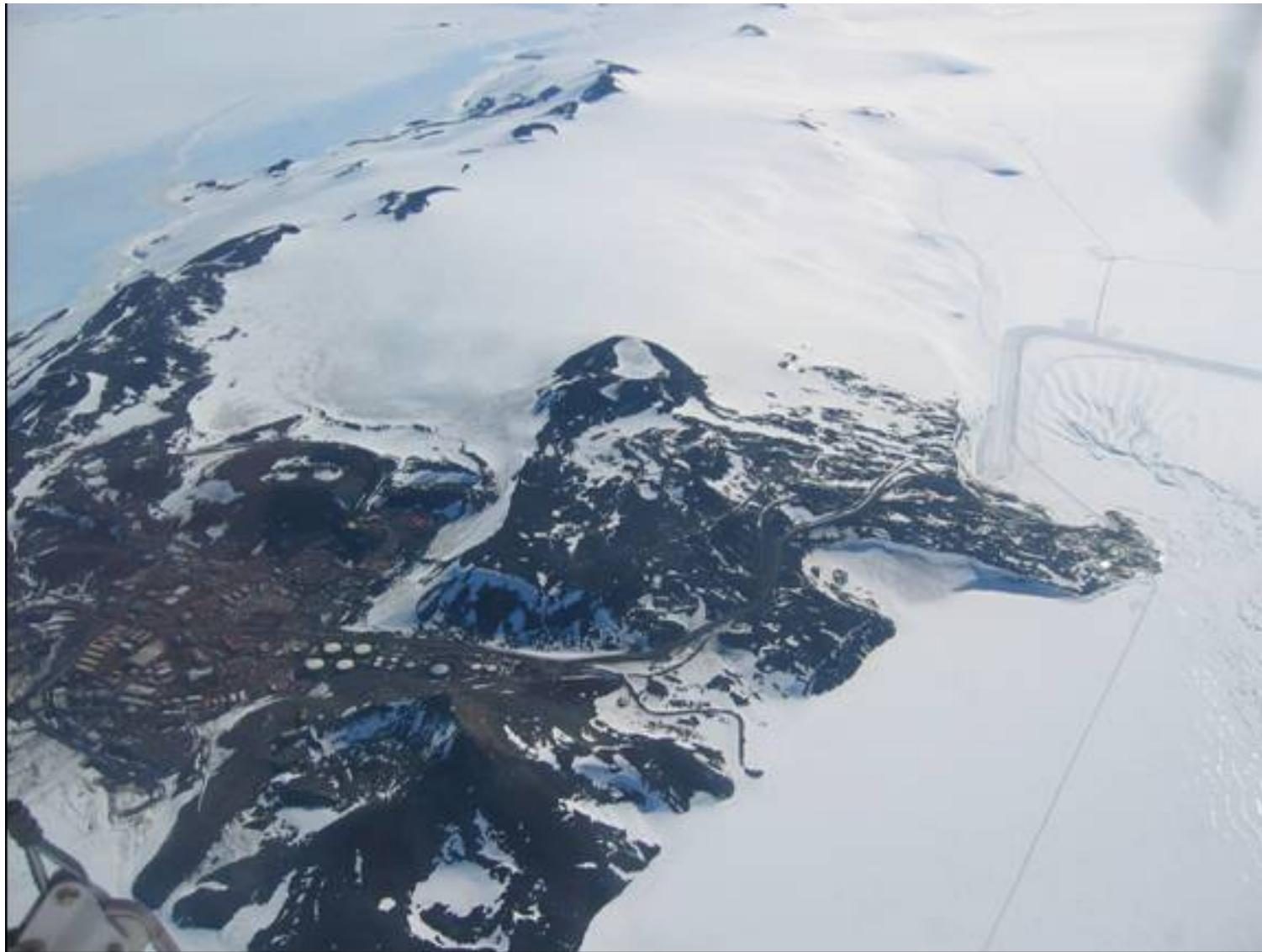
SNL X-band MiniSAR Mosaic of McMurdo and Scott Station (1 ft resolution)
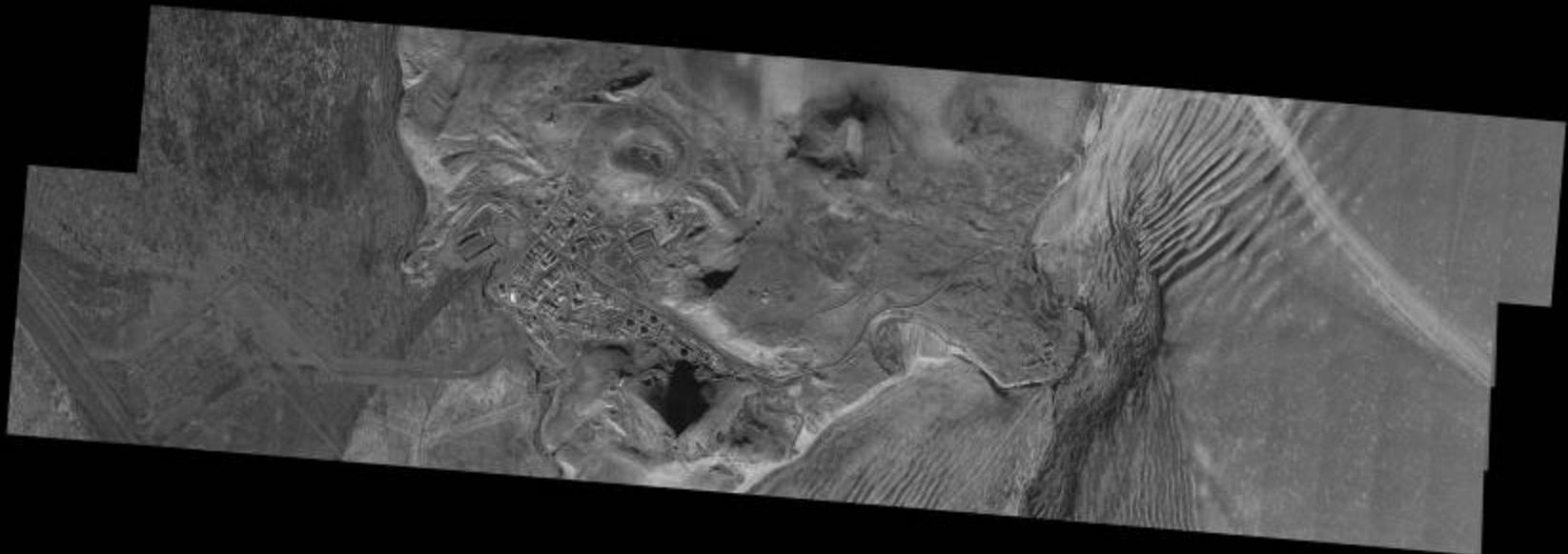
Close up of McMurdo Station (1 ft resolution)

Searching for Crevasses

Tres Hermanas (3 sisters) Crevasse Area
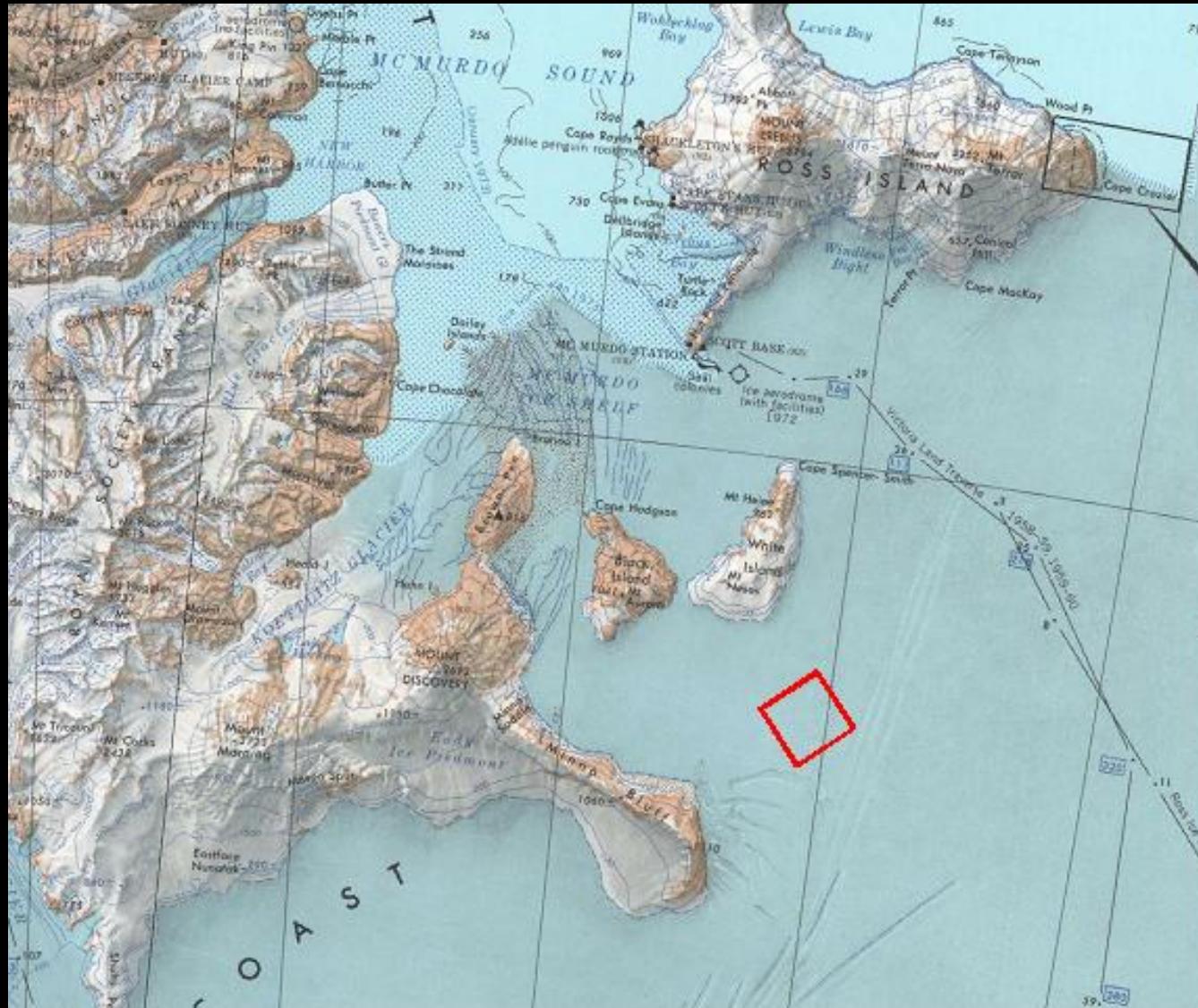
Crevasse Site Photo

SNL X-band SAR 1-ft view of Tres Hermanas (3 sisters) crevasses
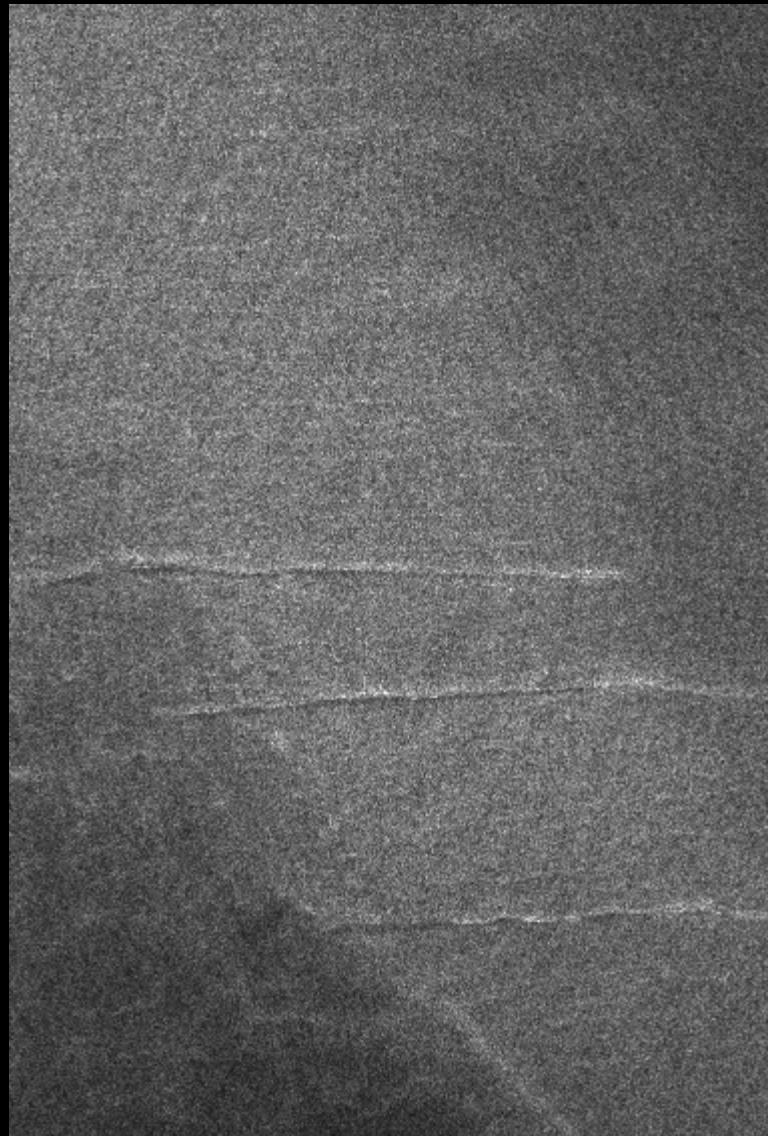
Crevasse Site X-band MiniSAR Image
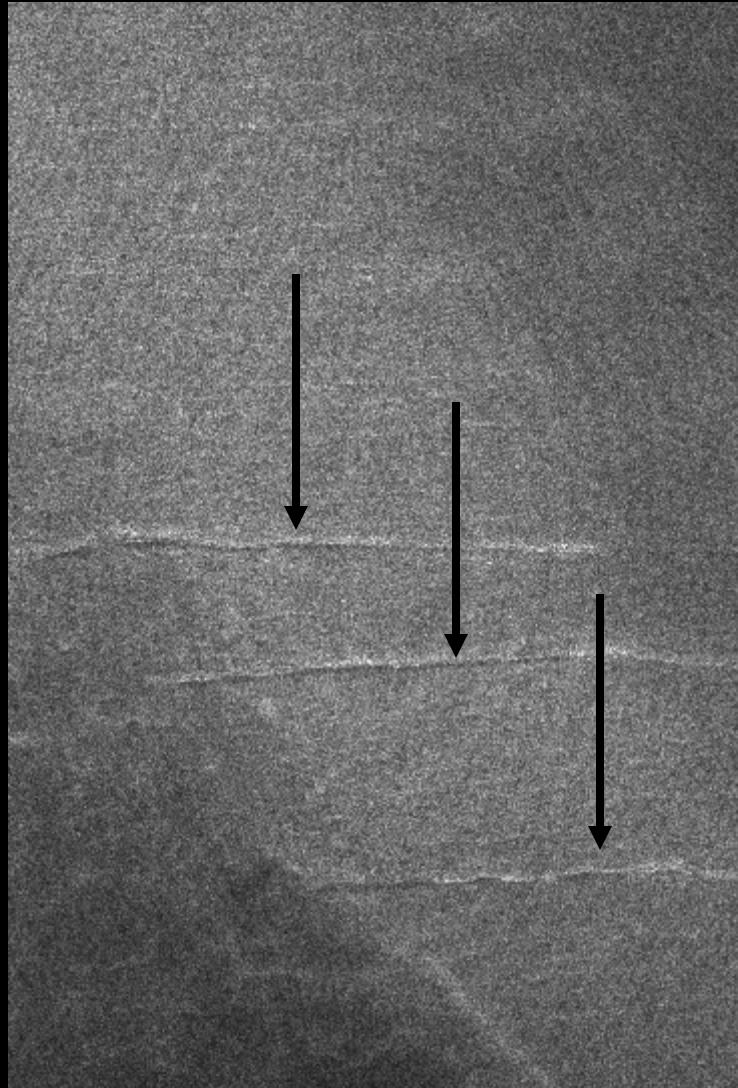
Photo of one of Tres Hermanas crevasses

Orientation Makes Some Difference
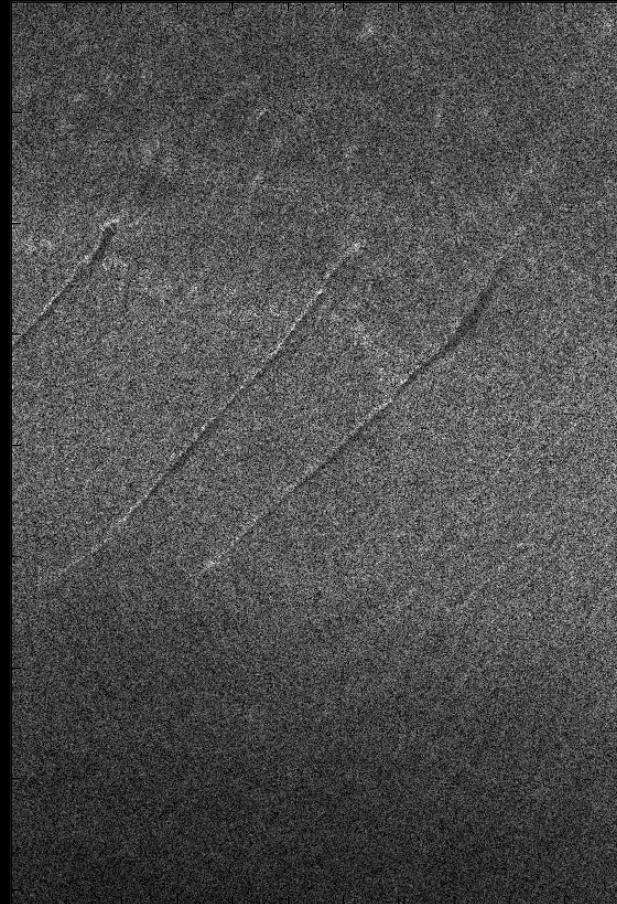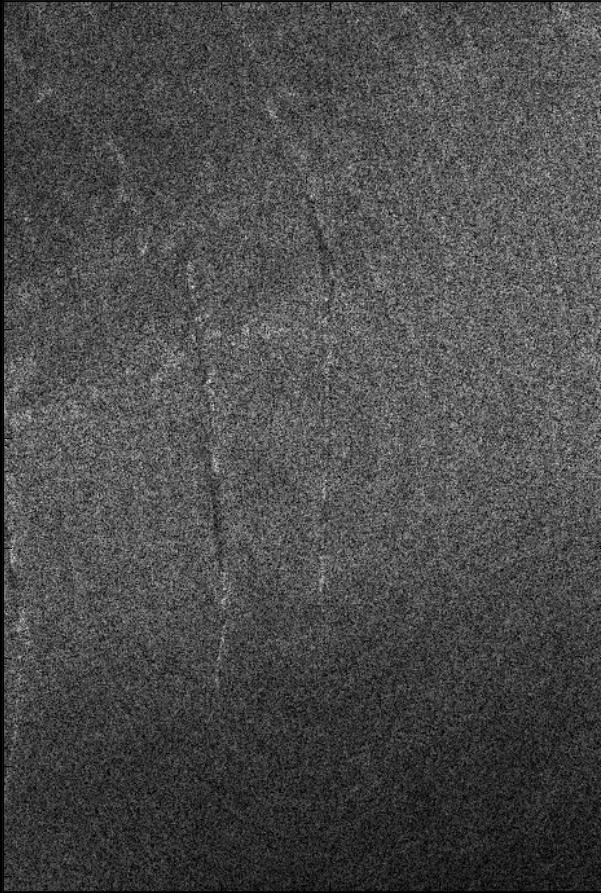
Resolution Makes a Big Difference
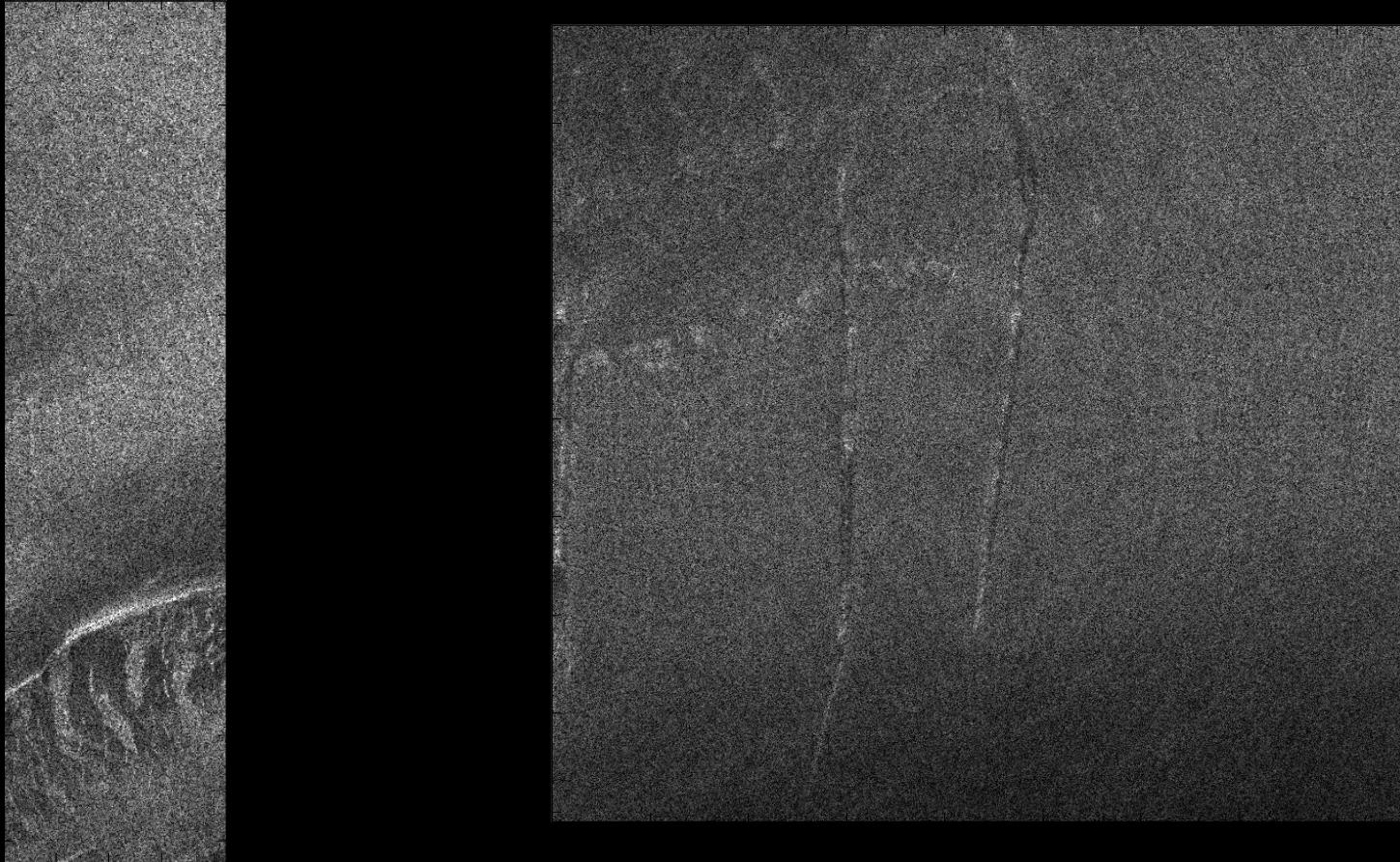
5 nmi by 5 nmi Mosaic of Tres Hermanas Site
from 1 foot Resolution X-band MiniSAR Data
(06Dec2006)
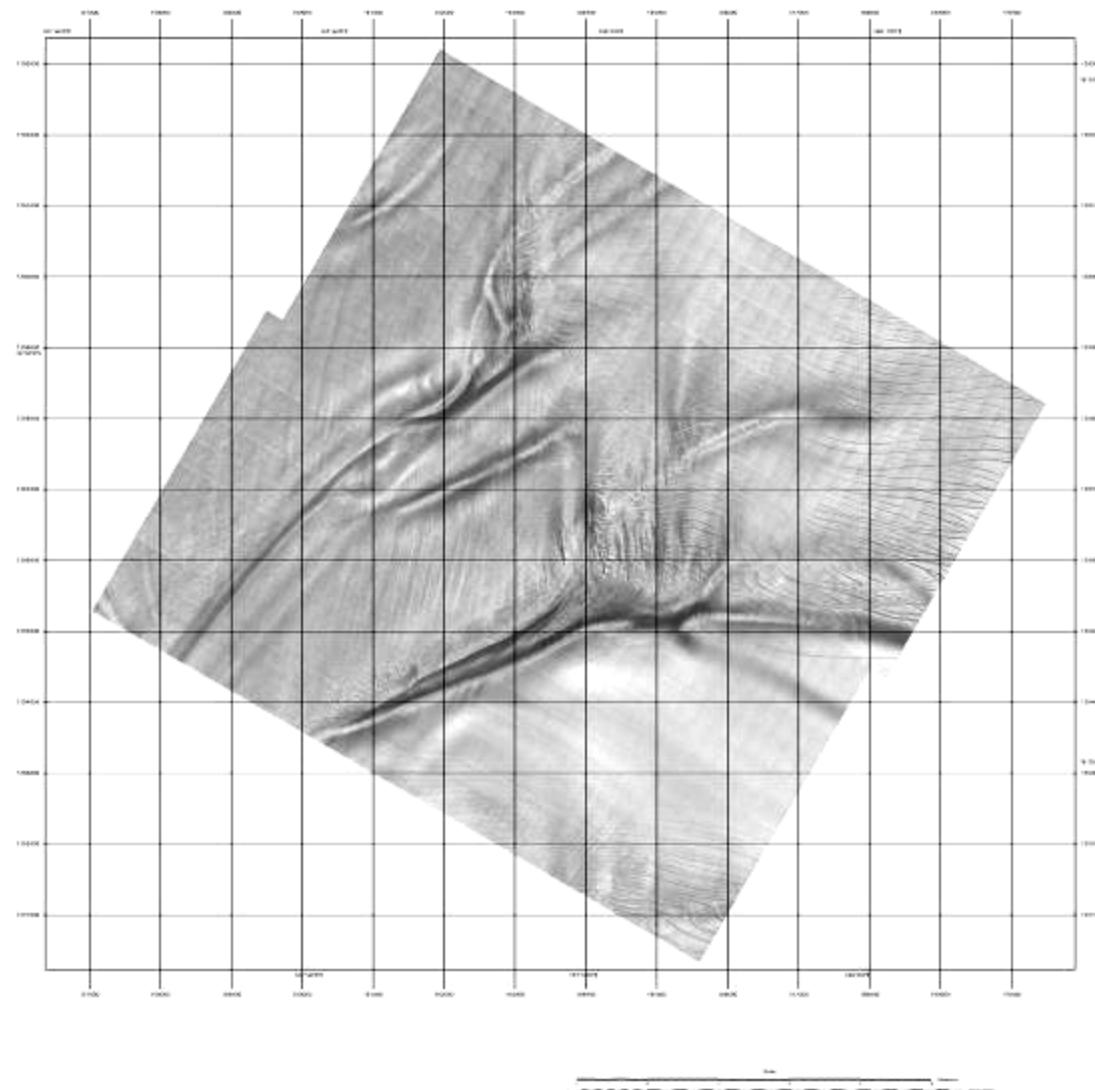
South Pole Traverse

- "The safe road the team built across the treacherous terrain is the first piece of what may someday be a regular surface route from McMurdo Station to the South Pole, freeing up ski-equipped LC-130 airplanes for other missions."
- The shear zone is deceiving, "a vast, flat, featureless plain of snow," Wright wrote in one of his weekly reports. But that seemingly solid ground has swallowed vehicles whole. In 1991, Brian Wheater and Quentin Rhoton were driving a tractor across the shear zone when the snow gave way and the D8 tractor plummeted into a crevasse. They were rescued several hours later, but the tractor remains buried north of the road Wright's crew built.

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South Pole Traverse Site
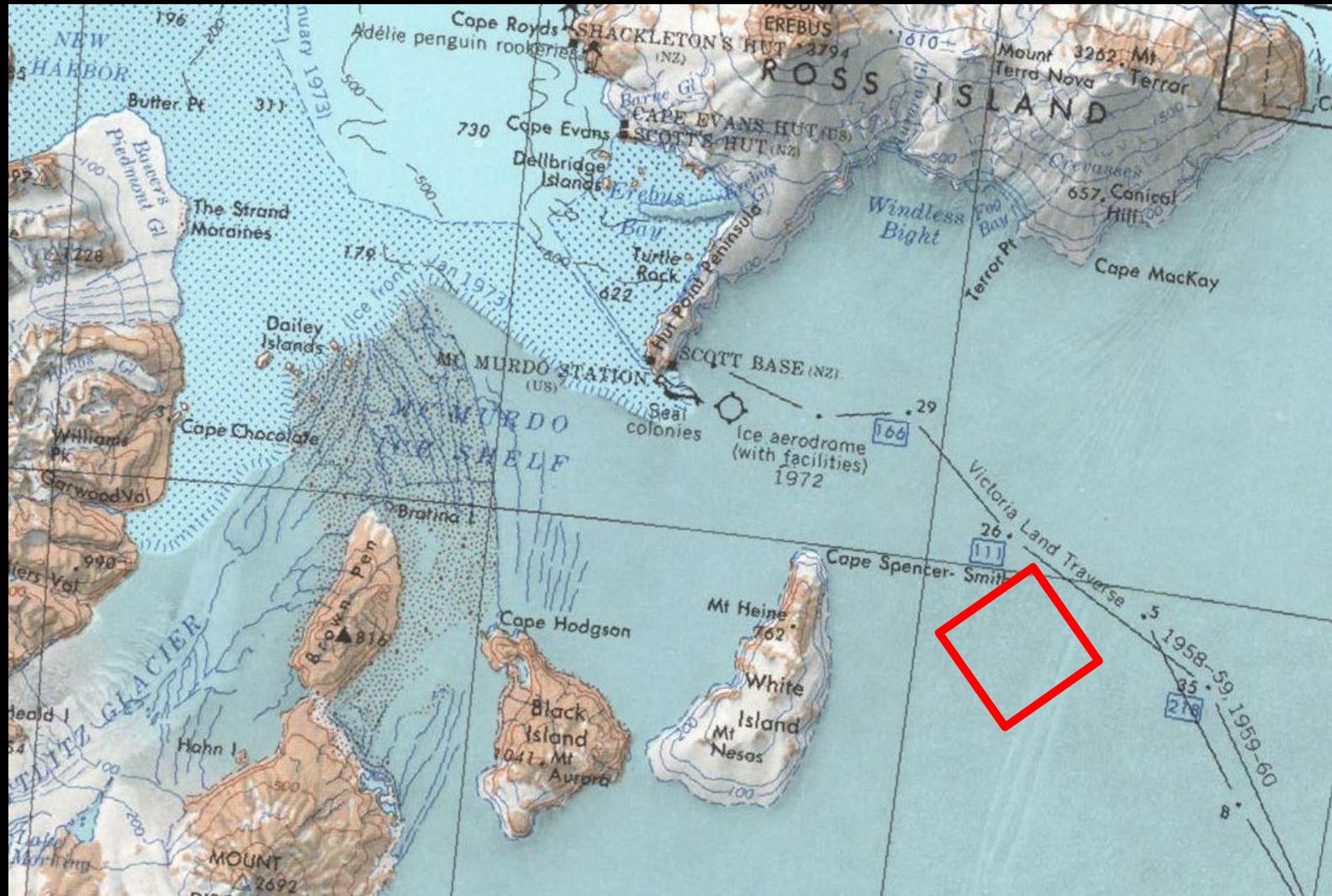
**SNL X-band MiniSAR Radar for Crevasse Detection
Mosaic of South Pole Traverse Area
(1-foot resolution 5 nmi by 5 nmi mosaic)**

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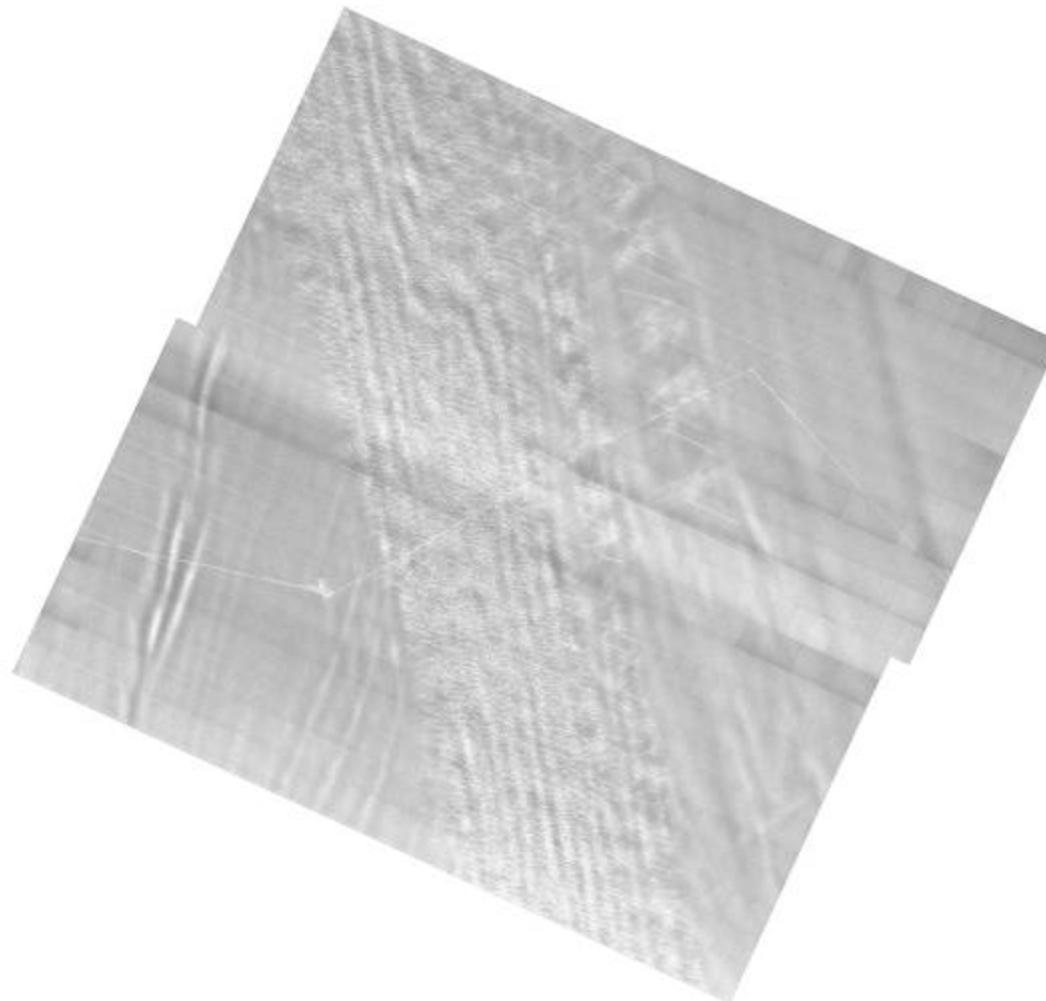
# Ice Motion
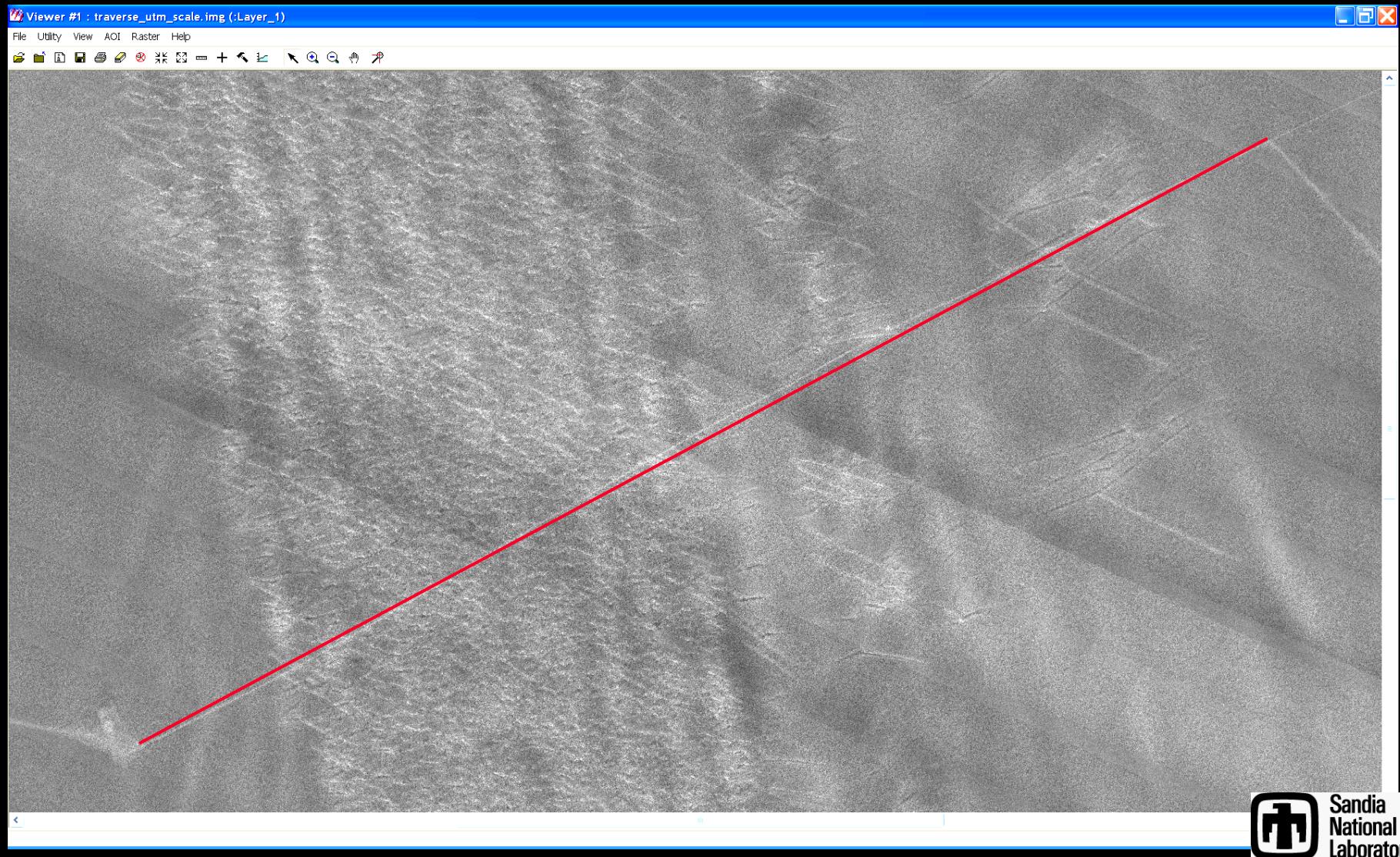
South Pole Traverse - Radarsat
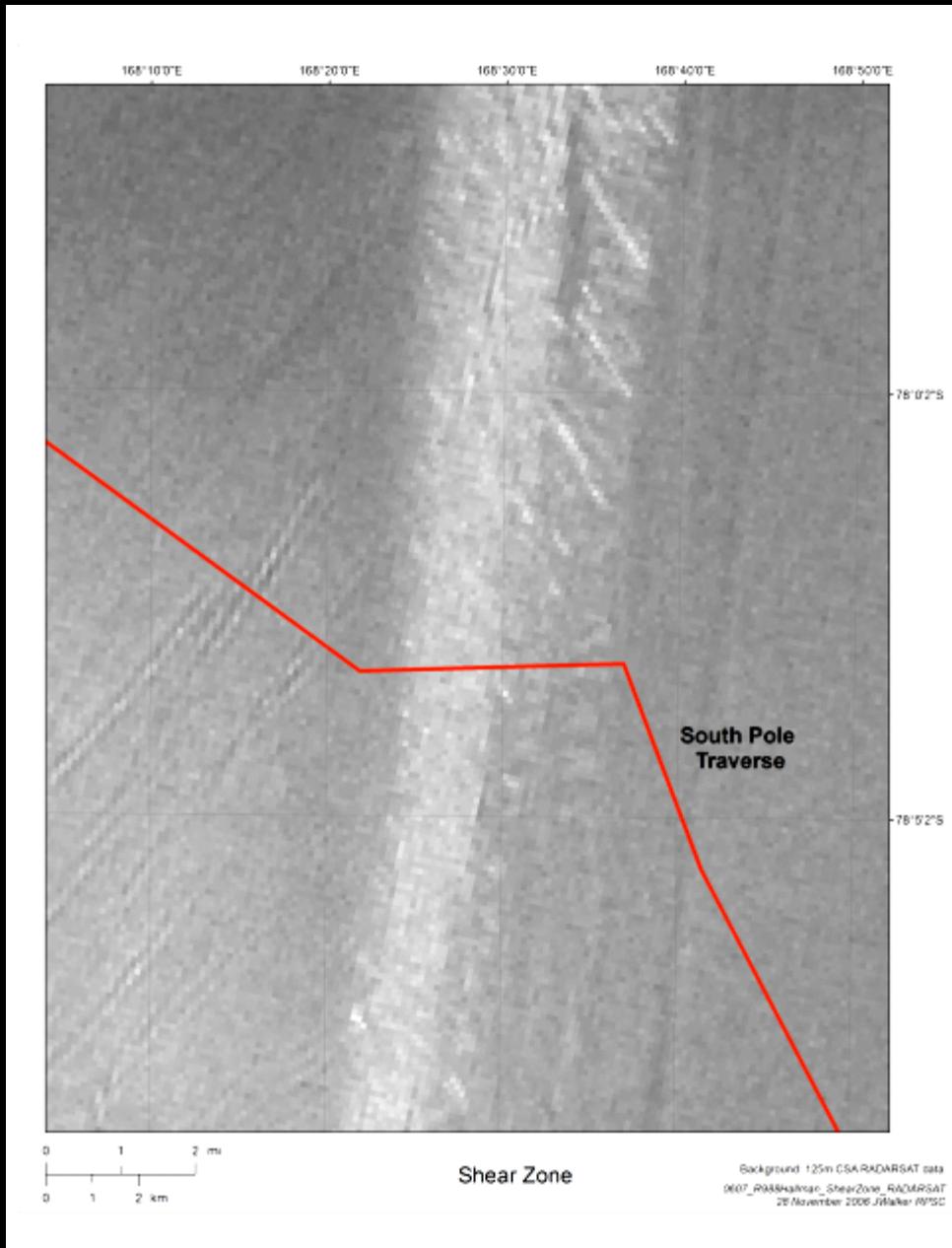
Taylor Dome Site

Aerial Photo of Taylor Dome crevasses

# SNL X-band SAR 1-ft view of Taylor Dome crevasses

Simulated Crevasse

Simulated Crevasse

Simulated Crevasse

Potential Subsurface Reflectors

Surface Reflectors

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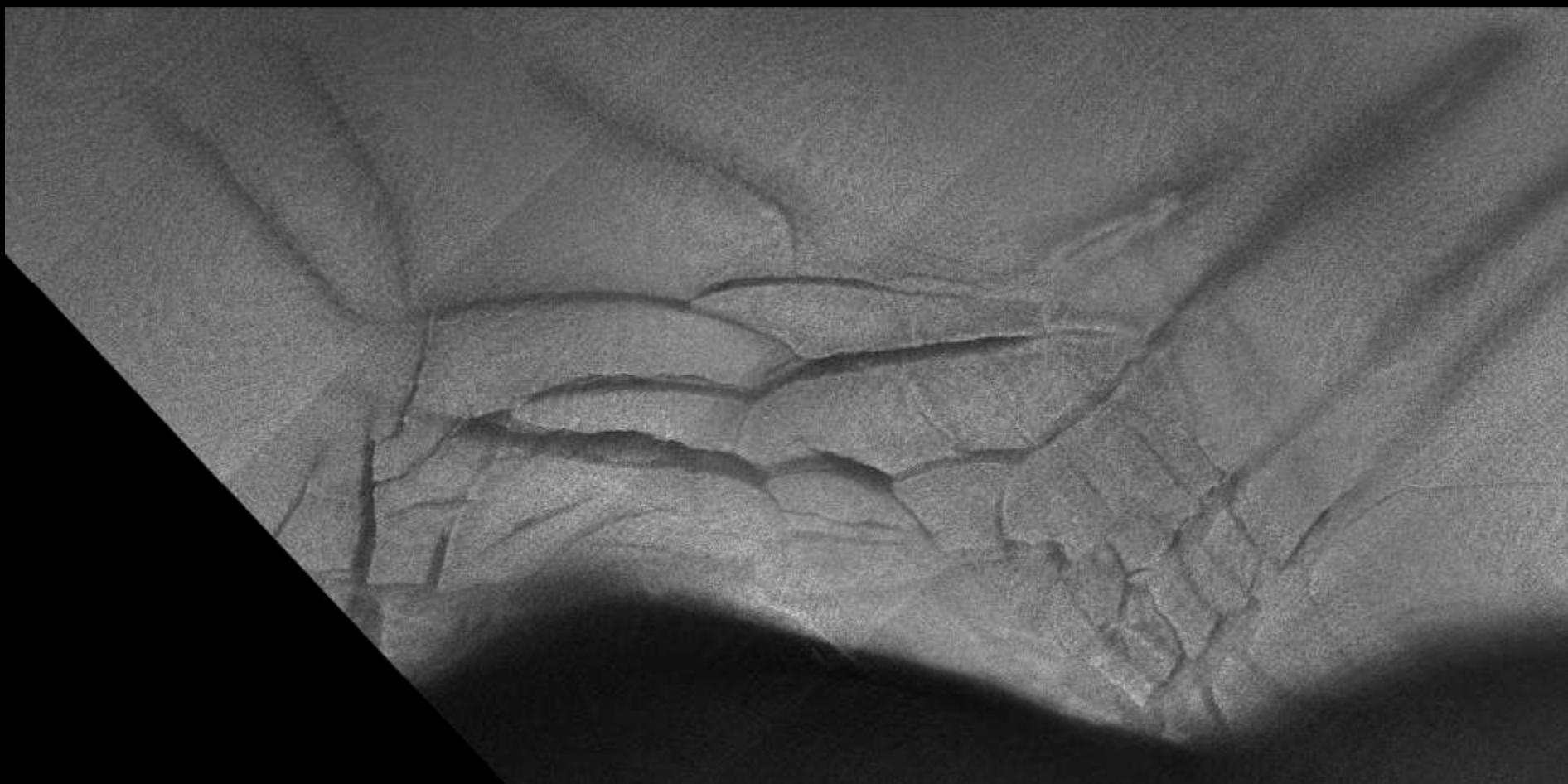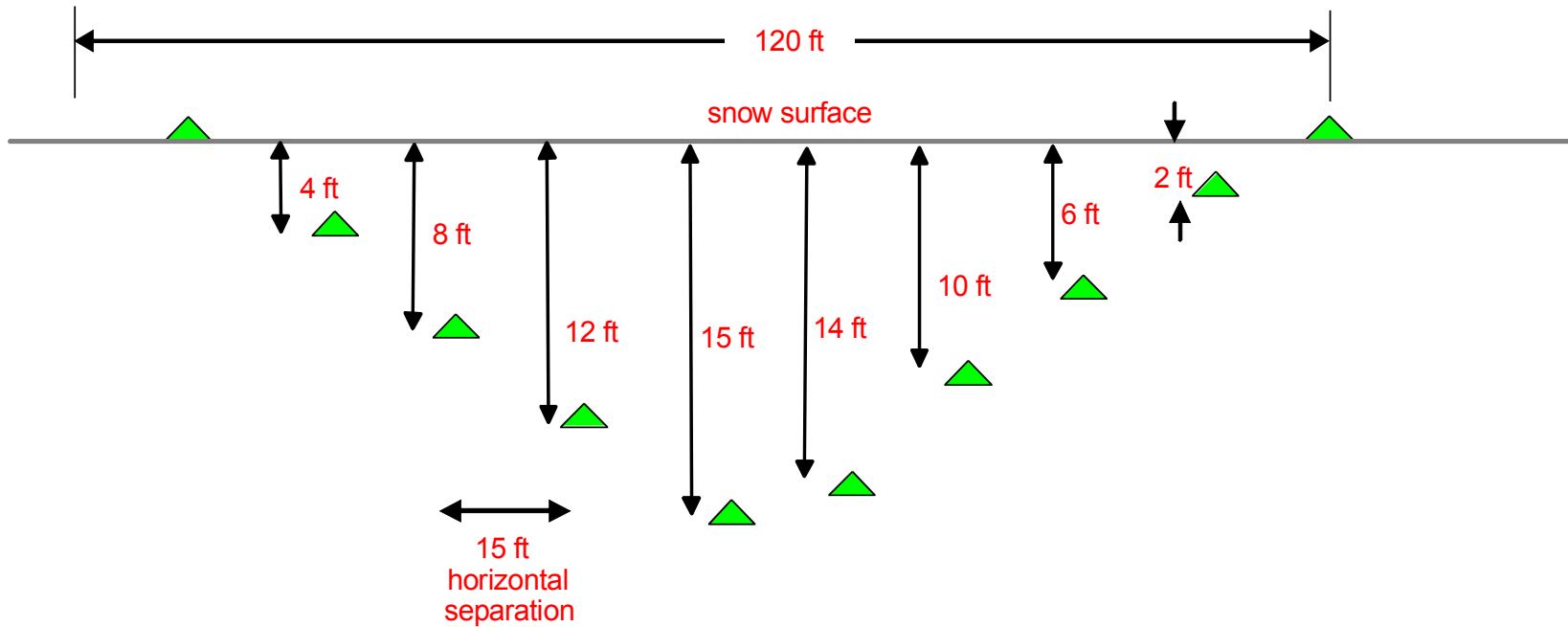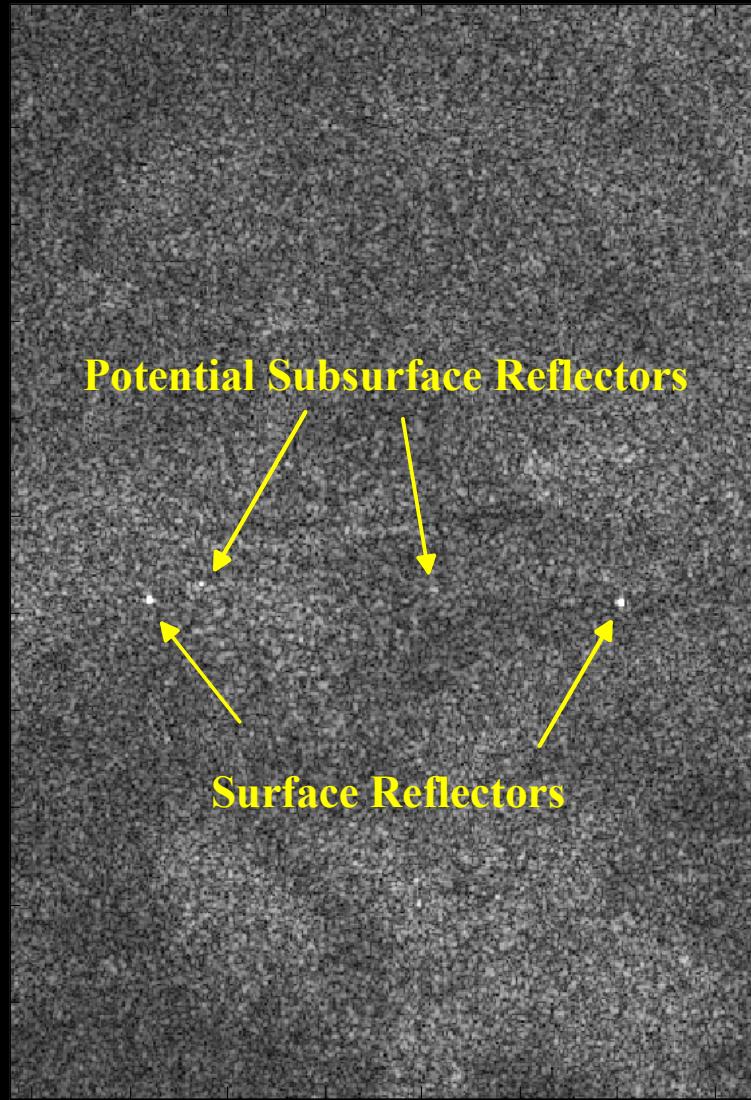
Pegasus Wreck Site

Pegasus Wreck Site

Burn Site

Pegasus wreck

Box

Barrel

Flags

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HAPPY CAMPER!!

The End